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Volume 8 - FEBRUARY 1932 Number 2

EDITORIAL INFLUENCE

An Industry of immense potential growth and usefulness—less than forty years old and already selling over a quarter-billion dollars worth of goods—meeting the manufacturing needs of over 35,000 purchasers in 300 different fields—known to the public (readers of Time, Fortune, American, Saturday Evening Post, Literary Digest, etc.) as an essential—THIS INDUSTRY suffers terrific price-raiding by some who believe themselves bigger than the Industry itself.

GARFIELD MANUFACTURING CO.
GARFIELD, NEW JERSEY

December 31st, 1931.

Mr. R. C. Gilmore, Jr., General Manager,
Plastics Publications, Incorporated,
114 East 32nd Street,
New York City.

Dear Mr. Gilmore:-

Your remarks under the caption, "And Now in Closing" in the current issue of Plastics and Molded Products concerning conditions in the Molding Industry should have the hearty approval of all well-wishers of this industry.

Of course, the role of the prophet is not a popular one, but I feel sure that the right-thinking element will stand by you and that you will have the satisfactions that come to all men who have courage in these trying times, as soon as the inevitable day of reckoning comes to those who may now criticise you.

You know the old French proverb, "He, who excuses himself, accuses himself."

Permit me to congratulate you on your vision and well-expressed challenge to the Molding Industry.

With kind regards and wishing you a Merry Christmas,

Yours sincerely,

BRR/BA.

For close to seven years, PLASTICS & MOLDED PRODUCTS has built the proof that no one company or individual is greater than the Industry — Our December Editorial brought instant support of our stand from leaders and customers — None more pleasing than those we reprint here.

The future of the Industry lies in the success, or failure, of its present policies.

NEW YORK CITY
CHICAGO, ILL.

American Record Corporation

CLEVELAND, OHIO
DETROIT, MICH.

CONSOLIDATION OF
THE SCRANTON BUTTON COMPANY
PEARL RECORD COMPANY
CAMEO RECORD CORPORATION

Manufacturers of Moulded Products

Scranton, Pa.

January 26
1932

Plastics & Molded Products,
114 East 32nd St.,
New York City.

Attention Mr. R. C. Gilmore, Jr.

Gentlemen:

Referring to your letter of January 12 in regard to your two column editorial appearing in your December issue and referring to the demoralized condition prevailing in our industry, I have previously written you, and I thought this was a timely and constructive editorial that was needed and should be heeded by our industry.

In line with your further request, I am glad to write you again that anything and everything we can do individually and collectively is needed at this time to recognize and wisely handle the situation ahead of us all.

In every industry, including our own, the intense pressure and momentum is still under way to demand lower prices and lower costs. Each industry in turn is trying to pass this on to their various sources of supply. In this present year we are going to have to very definitely face the issue that there must be an adjustment between the irresistible force and the immovable object.

Our industry, individually and collectively, cannot continue to squeeze down costs and cut selling prices. The pendulum is still swinging in the one direction but it has got to be stopped and started swinging the other way. The longer we delay in recognizing this, the more disastrous it is going to be. All industries seriously face this problem but it is our job to protect ourselves. How long are we going to delay in recognizing that the time must come to stand and help turn the tide?

Yours very truly,

AMERICAN RECORD CORPORATION

John P. Carr.

Vice President

JPC/L

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PLASTICS & MOLDED PRODUCTS

Reg. U. S. Pat. Off.

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PLASTICS PUBLICATIONS, INC., PUBLISHER

Just The Material They Needed

TEXTOLITE molded is used as a double-cone friction clutch in the No. 2 Ball-bearing Tapping Attachment manufactured by the Leland-Gifford Company of Worcester, Mass.

Textolite molded was just the material they needed. Because it possesses a surface which allows smooth, positive engagement without harsh "grabbing," it more than tripled the life of the clutch — resulted in a smoother running machine — and all at a lower cost.

This illustrates just one case where Textolite molded has been adopted with marked success.

Possibly you have a part that also could be advantageously molded?

We shall be pleased to send you a copy of our bulletin, Plastic Products. Simply address General Electric Company, Plastics Department, Meriden, Conn.

also **—**
Textolite laminated
Cetec cold-molded

831-10

GENERAL ELECTRIC

PLASTICS DEPARTMENT, MERIDEN, CONNECTICUT

PLASTICS & MOLDED PRODUCTS

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Volume 8 FEBRUARY, 1932 Number 2

MOLD makers report activity in new construction, a sign that new molded parts are soon to go into production. In planning new molded jobs, manufacturers are often faced with delays when molds must be modified. Molders cannot make deliveries without molds. These new molded parts are past the mold problem stage and are now in production.

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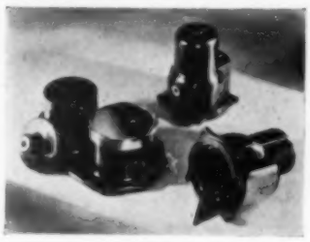


Airplanes use numerous resinoid molded parts because of their unique electrical properties. The instrument cases on the left are molded by Molded Insulation Co. for U. S. Army planes. An intricate job using black Durez. The Breeze Corp, uses Bakelite in the molded shields, on the right, which eliminate ignition interference with radio reception.

•

A steel tape, produced by James Chesterman & Company, Ltd., Sheffield, England, which is housed in a case made from a special shock resistant Bakelite molding material.

•

One of the unusual features of the new Manicure Ensemble recently announced by Culver Laboratories is the Culver Nail Bath, molded of black Durez. This device is filled with the Culver Nail Liquid, and the user inserts the finger in the hole in the soft rubber top, immersing the finger-tip in the liquid. Other fingers can be manicured while the liquid is doing its work. The nail bath and its cover are molded of special alkali-resisting black Durez. The closures on the three bottles are also molded of black Durez.

•

Hammond Clock Company's synchronous electric clock is modern in design, with a Bakelite molded case in black or walnut. Molded by Chicago Molded Products Corp.

•

Many articles have been improved, both in appearance and utility, with the use of molded parts. The two memo pads shown here fall in this class. The telphone roll-memo, molded by Northern Industrial Chemical Co. out of Durez, has a catch to hold it any position. It fits all types of phones. The calendar memo, of Bakelite molded, is manufactured by Boonton Molding Co. for Keith Clark, Inc.

•

A number of new laminated plastic developments are discussed elsewhere in this issue. Most interesting is the new hollow baseboard developed by Panelyte which can be sawed like wood. As one authority says in these pages, this is but merely a beginning.

Intensive Merchandising Will Elevate Laminated Plastics to Wide Utility

By W. H. Kempton

Mr. Kempton writes with authority on both the laminated and molded branches of the plastics industry. For more than twenty years he was associated with Westinghouse, Bryant Electric and other companies in this work. In this article he contrasts the growth and future of these versatile materials.

THE specification for this article called for a discussion of the relations of molded composition or molded resinoid, and laminated resinoid, especially with reference to the market for the laminated product. In order to simplify the wording of the matter and in the absence of an official general name, the laminated product will be called "laminated" and the molded compound simply "compound". There is no intention or desire to suggest these names for general use but every time an article is written on either subject a new illustration of the need of such a name or pair of names is furnished.

This is written from the point of view obtained by many years of effort in the development of new materials of both classes to meet specific, commercial problems. These problems involved the elements of suitability and performance of material, practicability and mthods of manufacture, tool design, cost and availability of raw materials. That is to say, it included every phase of the subject up to the practical manufacture and use of the article in question. These studies covered both compound and laminated and a free choice was available as between the two classes of material.

This combined activity developed very clearly the fundamental similarity between the two products. This similarity is striking. The compound consists of fibre and phenolic resin. The laminated consists of fibre and phenolic resin. Both are formed under action of pressure and heat. From a purely material standpoint they are identical. Still, mechanically, and to a lesser extent electrically, they are widely different. An interesting phase of this question is—how is this difference brought about?

The difference is the result of manipulation of raw materials. For instance, the most common form of compound is formed of loose wood fibre and resin. The most common grade of laminated consists of wood fibre, in paper form, and resin. It is a common inference that the greater strength of the laminated is due to the fact that the paper has strength while the loose fibre has none. This is also wrong, for the strength of the paper, as paper, has little effect on the strength of the laminated product.

Properties of Laminated

The greater strength of the laminated is due to the character of the fibre and the fact that it is laid largely, in two directions, lengthwise and crosswise. The fibre, in compound, is put in place in a heterogenous manner so that it lies in all directions. That is to say, the laminated is built, with the fibre arranged to work to the best advantage to produce the maximum of strength in the desired direction to the sacrifice of strength in other directions. Laminated is weak, crosswise. The thin structure, however, usually does not find this weakness of importance. In some cases, as in punch stock, this feature has to be corrected by careful selection of paper.

In laminated the length and strength of the fibre has a great deal of effect on the strength of the finished plate. If the fibre is long and strong and is not damaged in the formation of the paper, then the plate will be strong without reference to the strength of the paper. In fact, the paper need only be strong enough to stand the strains of processing. Efforts to make the paper stronger may result in a weakened product as the fibres may be weakened in the paper making treatment.

Properties of Compound

In the compounds the permissible length of fibre is considerably restricted by the method of forming the article. Since the stock is "flowed" into place after heating, care must be taken not to interfere with the flowing property of the stock. Long fibres materially retard this flow. so only very short fibres can be used for a free flowing material. Further, the fibres are free to move in any direction, so they naturally appear at the surface. If long, the surface fibres will give a mottled or irregular finish. This problem has been so thoroughly worked out by the manufacturers of compounds that these re-

strictions have been largely lost to sight. The older molders will recall some of the early difficulty in getting good surface finish and color.

In the making of laminated, this restriction is largely removed. The forming operation is strictly one of compression. Any kind or length of fibre can be used that can be put into sheet form. This may be done by running it into paper or by weaving it into cloth. Finish can be had by using surface sheets of fine-fibred paper while the body may be made of a strong and, relatively coarse fibre. Color may be introduced into the surface sheet only and save the cost of coloring the entire body. Designs, or even pictures, may be printed on the surface sheet and reproduced on the plate.

In comparing the two materials, the outstanding feature of the compound is the rapid production of finished pieces. The most striking feature of the laminated is the wide variety of mechanical properties, shapes and finishes, that may be obtained. In most instances, one or the other of these two classes is clearly best adapted to a given use.

Factors in Choice

If a prospective user must have a very low cost and has a large activity, compound will best meet his needs. If strength and ruggedness is the dominant need, then the laminated product will be chosen. A rayon spinning pot can be made from laminated that will have four times the strength of compound, but will cost over twice as much to make. If the cost is the dominating consideration the compound pot will be used. If strength and permanence is the main consideration then the laminated pot will be chosen. In the case of large acid trays the laminated product only could be considered on account of weight. The laminated product can be made very thin due to its great strength and toughness.

The compound does not always win out on the cost basis. A process of molding a cover on electrical condensers has been developed and used. An attempt was made to apply them to radio sets but lost to the condenser made from laminated. A construction was developed to permit the use of laminated punchings that gave a cost far below the molded condenser. Large quantities of this type have been made.

Airplane propellers can be made from either compound or laminated stock. The former has never reached beyond a few experiments while very successful propellers have been made in quantity from the laminated material. In this case the strength requirements leave no choice as between the two materials.

Gear wheels can readily be molded from compound or laminated. Only the lightest of service can use the compound gear. The laminated gear is used in large numbers and for a wide variety of service.

Many examples might be given where either material can be fabricated into the part under consideration. In most instances a knowledge of the performance requirements will immediately determine which material must be chosen. In but few cases will the two materials come into conflict. They make a good working team that will widen the market for the manufacturer who is equipped to furnish both.

The compound field is much better known as it has, for some reason, been developed much more energetically than has the laminated. The uses number many thousand already and it is still in "low gear". Who can say where it will go when it is shifted to "second" and "high"?

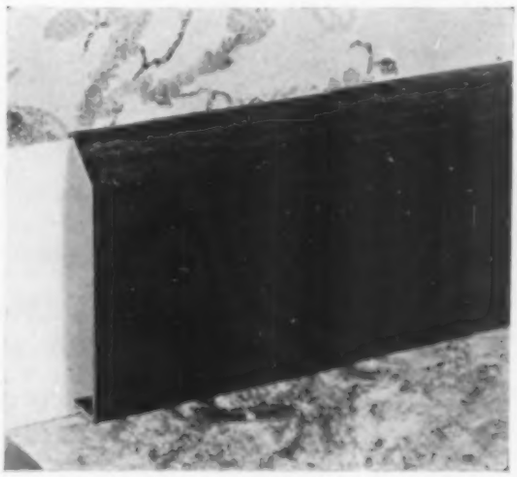
Uses of the laminated product have been given, relatively, scant attention. The reason why this is so is not so clear, but it may be the manufacturers of this material soon picked up a good profitable load and became satisfied, so did not extend their efforts further. Another element may be that the number of manufacturers is considerably less than in case of compound. The reason for this may be the great cost of setting up for the manufacture, the more difficult technique and fewer trained men available. It is quite certain that the profit has been much better in the laminated than in the compound field.

Marketing Possibilities

So far it has been the purpose to show how closely allied are the two products, from a raw materials viewpoint but how different, in finished characteristics. The rest of the discussion will have to do with the future possibilities of laminated products.

The method used for varying the mechanical quality of the laminated has already been mentioned. The comparison of

(*Continued on page 83*)



A new application in the phenolic laminating field is this baseboard developed of molded sheet-stock by the Panelyte Corporation. It is made in various colors and wood effects, and is mold-shaped at top and bottom to form a hollow space through which electrical wiring, conduits and telephone lines may be run. Top edge is bevelled to form a tight fit against the wall, and is slanted to prevent dust and dirt from collecting on the top surface. The lustrous, permanent finish resists the discoloring which results on ordinary baseboards from contact with brooms and mops. It is sold in predetermined lengths or can be obtained by the foot and sawed like lumber.

Photo Courtesy General Plastics, Inc.

Plastics Supply New Standard Parts and Accessories for 1932 Cars

SYNTHETIC plastics have played an important part in the development of the automobile and this influence is steadily increasing. Ignition systems became dependable when phenolic resinoids made practical, efficient molding powders and insulating varnishes. At the present time these plastic materials find such varied uses as strong, shock-resisting running boards and coatings on gasoline gauge float corks.

Newer plastic materials, simulating natural stones and ivory, find application because they combine a decorative note with strength and resistance to elements. The modern automobile has reached a stage of such mechanical dependability that designers and manufacturers can give more attention to the aesthetic details than ever before.

Standard Lumarith Knobs and Buttons.

Thus, in 1932, a number of stock cars are shown in which all the control knobs were molded of Lumarith, harmonizing in color with the interior fittings. All Hupmobiles have a special mottled mahogany knob on the choke to match the instrument panel. Hudson is equipped with grained ivory control buttons, and molded knobs on windshield and side window regulator handles. The special display model that Hudson showed was equipped with Lumarith molded steering wheel and steering column control parts.

DeLuxe 1932 Willys Overland models will be equipped with a yellow translucent mottled Lumarith gear shift knob and six control and choke buttons. All Durants will continue the use of the Lumarith oyster-white parts used last year.

Molded Accessories

Numerous new accessories combine molded resinoid parts. A striking new device is the Spark Beacon, whose radiant glow will indicate to you on your instrument panel—instantly, and continuously, the presence, and condition of your spark—the most important factor of engine performance. This Spark Beacon can also be used to test plugs individually. The Beacon and base are made of Bakelite molded material, and can be obtained in black, walnut, or mahogany, to match your instrument panel. The bracket is chromium plated.

A handy dashboard ash receiver for automobiles, the cup of which is molded of Durez in various colors, and which is being used by refiners, tire companies, etc. as a good-will gift to customers. The advertiser's trademark is processed on the cup, and a record of oil changes is kept on the card.

Molded resinoid gear shift lever knobs are no longer new. Lewis & Conger, however, furnish a new note in these knobs by supplying a sterling silver plate, bearing the owner's monogram, which may be inserted into a special Bakelite molded knob.

Cast plastics are as important as ever in automotive accessories. As additional equipment on many cars Marblette and Catalin dash lighters, fender guides, choke and control knobs and interior hardware trim find much favor with owners who prefer more color in fittings than the somber standard blacks and browns.

New Molded Resinoid Accessories.

New Fields for Laminated Plastics

Architectural and Decorative Uses Increase as Color is Combined With Mechanical Strength and Chemical Resistance

By W. G. Steiner

Formica Insulation Company

AN important field for laminated materials made with a binder derived from phenol, urea and similar materials lies in the production of decorative sheets in colors for buildings and for furniture and fixtures.

These laminated sheets are being made in a wide variety of colors—and with a brilliance and depth of color that has not been available in either natural or synthetic materials that were readily available for these purposes.

The laminated product combines with its qualities of appearance a very hard surface that will stand a great deal of wear. The sheets are cured under pressure running in most cases about 1,000 pounds to the square inch and under a high degree of heat. This produces a very resistant surface which will stand much abuse. This surface appears under test and by experience to be much more resistant to wear and time than any surface it is possible to put on wood or metal by air drying or by heat alone.

The synthetic varnishes used for laminating possess also a high degree of chemical inertness which is an additional advantage. Many natural materials such as marble are highly alkaline and dissolve readily in mild acids such as citric acid contained, for instance, in a lemon.

Resistance To Chemicals

The laminated materials have proved themselves to be sufficiently inert to stand all kinds of fruit juices and all liquids associated with food and drink—including alcohol—and to give very much better service than the materials commonly used for such purposes before laminated materials were available. The material stands moderate amounts of alkali and is not injured by mopping and washing.

Still another advantage of the materials is that they are not porous in the ordinary sense. There is no capillary action to suck in foreign fluids and cause stains as happens very frequently with marble.

As the process of lamination combines with the chemically inert binder a long-fibered base of high mechanical strength, does not break easily. It will stand much more rough usage than marble, glass, or materials of a similar nature which have been used in the past.

These are the useful qualities of the material on which its adaptation to buildings, fixtures and furniture uses depend. It has made possible a wide variety of applications, having naturally been adopted first for uses in which the older materials were giving the least satisfactory service.

One of the most severe types of service for decorative materials is encountered in table and counter tops in restaurants where no linen is used. These tops must stand hard wear on the surface as in many cases the china used is none too smooth on the bottoms; the tops are often banged together when the tables are pushed about, and a brittle material is easily broken; tops are subject to burning with cigars and cigarettes; a porous material will stain from the acids or the liquids of various kinds that may be spilled on the surface.

Advantages In Furniture

No material had fully met all of these difficulties when tables began to be offered which had ply wood centers and laminated phenolic veneers on the surface, but this new type of table top improved on most of the others in many ways.

It did not stain, and it did not chip or break. The surface was sufficiently hard and durable to stand ordinary service for many years. Its high resistance to heat (it will stand 300 degrees Fahrenheit) eliminated most of the tendency to burn. And novel and attractive colors and textures were available that could

Formica desk and table tops, wall paneling in the reception hall of the new research building, A. O. Smith Co., Milwaukee, Wis.

be adapted to any color scheme.

Still another factor was that owing to the severe nature of the service and the importance of attractive table tops in restaurants, the trade had been educated into paying well for materials that would in a measure meet the requirements—so that it was prepared to pay the cost of the laminated phenolic veneer tables, which are not cheap. High-grade materials seldom are.

Advantages Over Wood Veneer

Laminated phenolic material is prepared for table and counter tops, for deal plates in banks, etc. by veneering the laminated sheet on ply wood. The laminated veneers are attached to the top, edges and bottom of the ply wood with a waterproof glue. The core is completely surrounded with the veneer because the veneer passes very little moisture, and if moisture were completely cut off from one side of the wood while it was allowed to enter the other side, warping would be likely to follow under conditions where changes in humidity are common.

Another place in which builders of fixtures and equipment were more or less in trouble before the arrival of decorative sheet of the phenol laminated type was on the surfaces of show cases and counters which are near the floor.

Constant mopping in department stores and restaurants made it necessary to revarnish or paint such surfaces every few weeks. If marble or vitreous materials were used, there was usually loss through breakage both before and after installation. Some materials of the type were also porous and inclined to discolor.

The laminated phenolic material stands about 12 per cent of alkali and continuous mopping has no effect in breaking down its finish. It is not brittle so that it was possible to move a show case from one place to another without breaking the basing when it was applied.

Makers of fixtures for department and other stores very readily accepted the material and it has been widely applied for the purpose.

Much the same conditions with regard to cleaning have to be encountered on the interior of elevator cabs and the material has found some use in those locations.

Laminated phenolic sheet has also been used for store front bulkheads. In this case due to the extremes of moisture and temperature which have to be encountered, any kind of wood backing for the laminated phenolic sheet is considered undesirable except in extremely dry climates, and instead the Formica facing is put on two sides of asbestos sheet. Asbestos has the characteristics of absorbing moisture without changing its dimensions. The laminated sheet has to be attached with a type of adhesive that is not affected by moisture or by sharp changes in temperature or by the degree of heat that is likely to be developed in bright sunshine.

The surface of the material is not affected by chemicals which are present in the air and it maintains its surface intact for long periods.

Different methods have been developed for covering walls in corridors and lobbies, bathrooms kitchens, and public rooms in hotels and similar buildings.

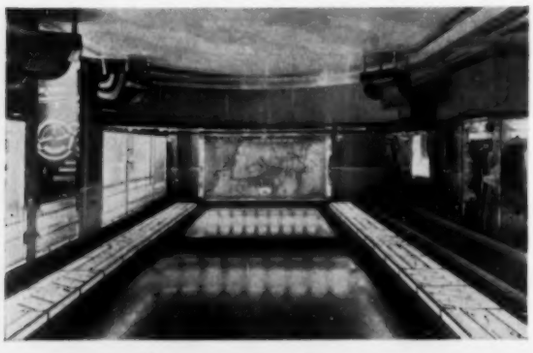
This is done either by cementing 1/16 laminated phenolic sheet directly to the wall or by putting a facing of laminated phenolic material on two sides of hard pressed board and cementing the entire sheet assembly onto the wall. Cap moldings and molded baseboard in the form of molded channels of laminated material are provided to complete the assembly.

Use In Contract Jobs

In the furniture industry laminated material began to be used on so called "contract" jobs, that is, lots of furniture made to order for hotels and hospitals. It has been used on a great many dressers and writing desk tops for hotel rooms, and on bedside tables and dressers for hospital rooms.

(*Continued on page 85*)

Formica counter tops and paneling, New York Central Ticket Offices, Michigan Ave., Chicago.



Mabley & Carew, Cincinnati Beauty Shop, with Formica Table Tops.

Formica work tops in a bank teller's position in a Boston Bank.

The Physical and Electrical Properties of Micarta Laminated Plate

By E. L. Wolfe

Westinghouse Electric and Manufacturing Co.

IN the past few years the use of phenolic laminated plate has experienced an exceptionally rapid growth, particularly for those insulating applications which require a high degree of mechanical strength. In addition to these applications, its use for decorative purposes has recently become very popular. Accompanying this growth is the desire on the part of the customer for data relative to the electrical and mechanical characteristics of this material so that he will be able to make intelligent application of the various grades.

Phenolic laminated plate has been manufactured by Westinghouse Electric and Manufacturing Company under the trade name of Micarta. While this article discusses specifically properties of and test methods for Micarta plate, the points brought out are in general applicable to most of the standard brands of laminated sheet material.

Description of the Material

Micarta plate is a laminated molded material which consists of sheets of paper, cloth, or asbestos, treated with an organic bond and molded together under pressure at temperatures varying from 140-200° C. Where strength and electrical properties are most important, the material is generally furnished in natural, (brown or tan), and black colors. The decorative grades may be made with paper, cloth, or asbestos, depending upon the strength, resilience, or fire-proofness desired. The surface of the final product may have any desired color or design, obtained by proper choice of the surface sheets.

The wood designs, which are photographic reproductions of wood, are popular for decorative applications such as desk tops or wall panels. Since Micarta plate has a hard surface which may be washed with soap and water and is not stained by alcohol or solutions which affect the surface of finished wood, it is especially desirable for such applications.

Physical Properties

The outstanding characteristics of Micarta plate are its high strength, light weight, relative toughness, thermal insulating value and resistance to corrosion.

Micarta plate is lighter and resists corrosion better than any of the common metals and is stronger than most of them when unit weight is considered. Although heavier than wood, it is much stronger and much more resistant to moisture. The strength corresponds to that of hard fibre but its resistance to moisture is greater.

Comparative properties of some of the common structural materials are given in Table I. These values are the average for the various materials.

The standardized test methods for laminated sheet materials have been worked out by the American Society for Testing materials Methods D 229-30 T, covering the following properties: Tensile, flexural and compressive strengths, thermal insulation value and moisture absorption. The methods for testing other properties are being investigated.

Tests of Strength

a. **Tensile Strength:** — The average pull required to rupture Micarta plate being tested with the grain will carry from 7,000 to 12,500 lbs. per sq. in. for paper base material and from 9,000 to 10,000 lbs. per sq. in. for cloth base material, depending upon the bare material and bond.

The tensile strength is generally greater with the so-called "grain" of the treated material than across the "grain". The

Table I. Properties of Structural Materials

Material	Tensile lbs./ sq. in.	Compression lbs./ sq. in.	Specific Gravity	Tensile, lbs. per cross section of same wt. as sq. in. of Micarta plate.
Aluminum, cast	15,000	12,000	2.70	7,650
Copper, cast	24,000	40,000	8.89	3,720
Steel, Structural	60,000	60,000	7.70	10,700
Tin, cast	3,500	6,000	7.30	660
Wood, poplar			0.50	
Hard Fibre	15,000	32,000	1.50	13,800
Micarta, FWG (1)	9,000	34,000	1.38	9,000
FWG (2)	11,000	40,000	1.42	

(1)=Paper base Micarta plate
(2)=Cloth base Micarta plate
FWG=Flatwise with grain

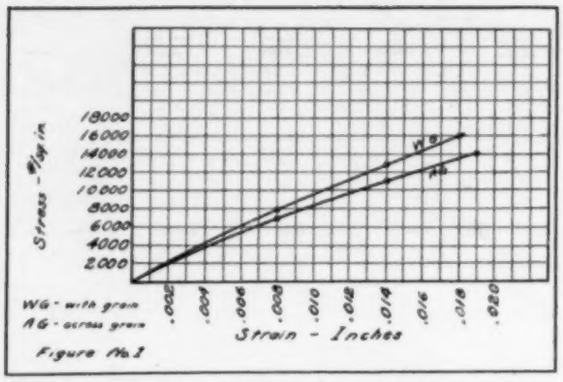


Fig. 1. Stress-Strain diagram of laminated sheet during tensile test.

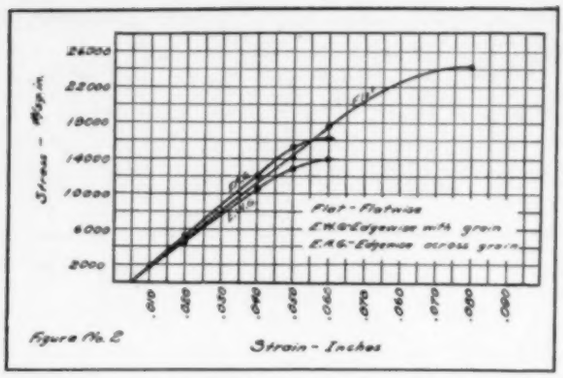


Fig. 2. Stress-Strain diagram of laminated sheet under compression load.

grain corresponds to the warp direction in cloth material and to lengthwise or machine direction in paper in roll form.

Figure No. 1 illustrates a typical stress-strain diagram of Micarta insulating material, paper base, during tensile test taken on an Olsen Testing machine with an autographic recorder.

The elongation under load may be taken during this test by attaching a specially prepared micrometer to the specimen and reading the amount of elongation or strain.

b. **Flexural Strength: —** Flexural strength is sometimes called bending or transverse. The flexural strength of Micarta plate is the stress per unit cross-sectional area calculated from the load required to rupture the specimen, when supported as a beam. Type of supports and distance between beams are fully covered in A. S. T. M. methods D-229-30T.

During this test a rough measure of the elasticity of the material may be taken by measuring the amount of deflection with a specially attached micrometer.

The average flexural strength of this material at rupture, flatwise with the grain, will vary from 15,000 to 21,000 lbs. per sq. in. for paper base material and 19,000 to 20,000 lbs. per sq. in. for cloth base material depending upon the base material and bond.

As with tensile strength the flexural strength is higher flatwise and edgewise with the laminations than flatwise and edgewise across the laminations. Micarta plate is generally used in applications where flexural stresses are encountered., The flexural and tensile values are proportional to each other, consequently in many applications flexural tests alone will serve as satisfactory control test of strength.

c. **Compressive Strength —** The compressive strength of Micarta plate flatwise will vary from 25,000 to 35,000 lbs. per sq. in. for paper base material and 35,000 to 38,000 lbs. per sq. in. for cloth base material, depending on the grade of material.

For thin sheets the compressive strength can only be determined in the flatwise direction by building up layers of one inch square pieces to a thickness of one inch.

For materials one inch and over in thickness, tests can be made on one inch cubes, flatwise and edgewise. The edgewise compressive strength is generally about ⅓ to ½ that of flatwise compressive strength. The edgewise tests give some measure of the strength of the bond between laminations.

Figure No. 2 illustrates a typical stress-strain diagram for Micarta under a compression load, the tests being made on an Olsen machine with autographic recorder.

d. **Tensile Split —** Tensile split is very important for laminated material, as it determines the strength of the bond. A number of test methods have been proposed for measuring this property, but most of them have serious drawbacks. Most of the specimens require intricate machining which tends to cause an initial dislamination unless very carefully done.

The present Westinghouse Electric and Manufacturing Company method which gives fairly good comparative results when machining operations are followed carefully and machined as shown in Figure 3 for this test. This method is limited to material ¾ inch and over in thickness.

In making the test, two U-shaped supports are arranged to fit over the test specimen as shown in Figure 4.

The tensile split will vary from 200 to 1,000 lbs. per sq. in. for various grades of material.

e. **Hardness —** The Brinnell, Rockwell, and Sclerescope methods of determining hardness have been tried on Micarta plate. The Rockwell and Sclerescope methods give doubtful values due to the type of material. The Brinnell method is satisfactory for material over ⅛ inch thick. The hardness, ranging from 24 to 42, depending upon grade, has been determined by the Brinnell on sample perpendicular to the plane of the laminations.

Electrical Properties

Micarta plate has good electrical characteristics which are not affected to nearly as great an extent under humid conditions as wood or hard fibre. This material is being used in many applications where high frequencies and low moisture ab-

sorption properties are required; where high dielectric strength is required, and also in a number of other applications where good insulation and low losses are important.

a. **Dielectric Strength** — The voltage breakdown at which this material will puncture varies from 150 to 900 volts per mil thickness on samples 1/16" thick, depending on the grade, for the short time method of test. These tests are made perpendicular to the laminations.

As the material increased in thickness the voltage per mil thickness required to puncture it will decrease until for material two inches in thickness the voltage required may only be 100 volts per mil. In most applications the voltage is applied parallel to the laminations due to the fact that the terminals pass through the material. The dielectric strength of Micarta plate having voltage applied in this manner will be considerably lower than if the voltage is applied perpendicular to the laminations.

There are two methods being used to determine the dielectric strength of this material, the one is the "short time" method in which the voltage is increased at the rate of 500 volts per second until breakdown occurs and the other is the "step by step" method in which the voltage is raised in steps of 500 to 10,000 volts, depending on the thickness, the voltage being held at each point for one minute until breakdown occurs. The voltage required to puncture the material by the "step by step" method will be approximately 60 to 70 per cent of that required for the "short time" method.

Quite a large variation has been experienced in the results obtained by the short time method due to the rate of raising the voltages. If the voltage is raised at the rate of 1,000 volts per second instead of 500 volts, the breakdown voltage will be considerably higher and will not be consistent with results obtained at 500 volts per second. A voltage increase of 500 volts per step has been approved as standard by the American Society for Testing Materials in Test Methods D-150-27-T.

b. **Volume Resistivity** — The volume resistivity is not of much value in determining the properties of Micarta plate, as it only measures the resistance between the two parallel surfaces perpendicular to the laminations. In very few cases is the resistance desired through the material perpendicular to the laminations, as generally the terminals at which voltage is applied are perpendicular to the laminations, hence the voltage is applied parallel with them. The surface resistivity and insulation resistance are of value in most applications as they measure the resistance parallel with the laminations.

c. **Surface Resistivity** — The surface resistivity is of value as it gives a measure of the resistance of the surface per unit area which helps to determine the distance required between terminals. However, the results obtained are dependent upon the conditions under which the tests are made. If there is considerable moisture in the air, the resistance will be low, and if air is dry it will be high. In order to reduce this variation, methods are now being investigated by American Society for Testing Materials to give uniform results.

The following table gives the surface and volume resistivity of some of the materials most commonly used:

	Resistivity Ohms	
	Surface	Volume
Wood, poplar	$5x10^{11}$	$1x10^{12}$
Hard Rubber	$1x10^{18}$	$3x10^{15}$
Mica, Molded	$1x10^{15}$	$5x10^{13}$
Hard Fibre	$2x10^{10}$	$3x10^{15}$
Micarta (1)	$1x10^{13}$	$1x10^{12}$
(2)	$1x10^{11}$	$4x10^{11}$

(1) Paper base Micarta plate
(2) Cloth base Micarta plate

d. **Insulation Resistance** — The insulation resistance of Micarta plate will generally be over 5,000 megohms at ordinary atmospheric conditions. However, if the material is exposed to high humidity, conditions for some time the insulation resistance will be lower due to the fibres absorbing moisture.

It can be said that in general, Micarta plate having low moisture absorption will not change a great amount in insulation resistance after exposure to high humidity, whereas material having high moisture absorption will change a considerable amount.

e. **Power Factor, Dielectric Constant and Loss Factor** — Requests for power factor tests at 10^6 cycles (radio frequen-

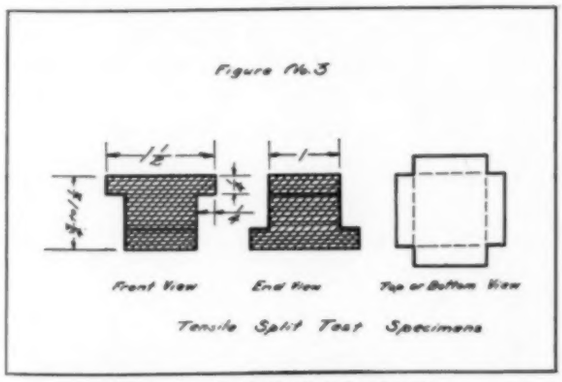


Fig. 3. Tensile Split Test Specimens.

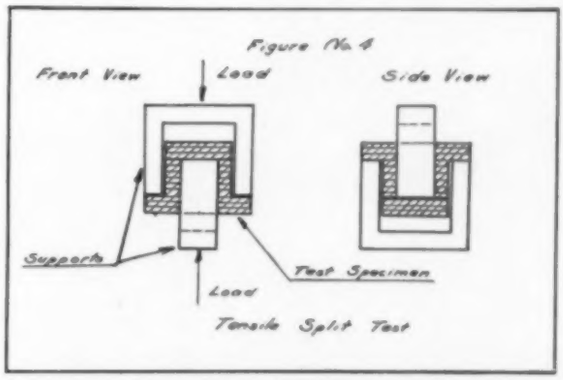


Fig. 4. Tensile Split Test Specimens With Supports.

cies) and 10^8 cycles (audio frequencies) on Micarta plate have increased in the past few years with the development of the radio industry. Coupled with these tests are the dielectric constant (S. I. C.) and dielectric loss factor at the same frequencies, these being a measure of the electrical losses in service.

Power factor may be described as that per cent of the energy lost in the insulation while passing through a condenser. In a pure condenser, the current leads the voltage by 90 degrees, but as loss is introduced in the material of the condenser, the current is retarded by a small angle, depending on the losses. The tangent of this angle gives a measure of this power factor.

The dielectric constant (Specific Inductive Capacity) is the ratio of the capacity of Micarta plate to the capacity of a vacuum. The dielectric loss factor is the product of the power factor and dielectric constant. This quantity is proportional to the loss per unit volume.

Micarta plate prepared especially for radio frequency and audio frequency applications has an average power factor of 3½ per cent or less, average dielectric constant of 5 or less and an average loss factor of 0.16 or less.

To obtain material of this quality requires extensive control throughout the process of manufacture and manufacturing to very close limits. Other material having a higher power factor, dielectric constant and dielectric loss factor is sometimes used for high frequency applications.

Water Absorption Properties

While Micarta is resistant to moisture in the ordinary sense, the fibres of the material will pick up some moisture, if exposed to water or a humid atmosphere.

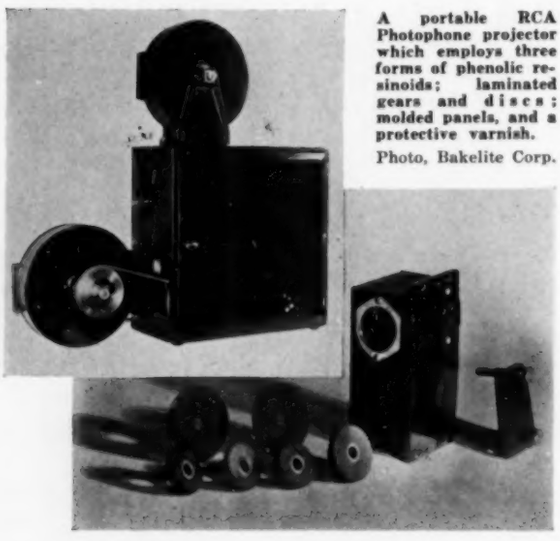
The rate of absorption when immersed in water is not very rapid as it requires from 4 to 8 weeks for samples 3"x1"x1/16 to become saturated. When saturated, the weight will have increased in some cases only 4 per cent and in others as much as 12 per cent, depending upon the grade.

The total amount of water absorbed at saturation is very low in comparison with other materials such as wood, hard fibre, etc., used for insulating purposes. Some of these materials increase in weight approximately 50 to 100 per cent in a very short time.

Good moisture-resisting Micarta depends upon the type of material used, the amount of resin used and the thoroughness of impregnation.

Factor of Safety

During the process of manufacture, a close supervision is maintained in order to obtain material with uniform physical and electrical properties, and because of this the safe working stresses, both physical and electrical, may be close to the ultimate limit. In other words, a high "factor of safety" is not necessary as is the case with wood, where the properties may vary.



A portable RCA Photophone projector which employs three forms of phenolic resinoids; laminated gears and discs; molded panels, and a protective varnish.
Photo, Bakelite Corp.

A factor of safety of five similar to that for a steady load on steel is satisfactory for mechanical design purposes with Micarta plate.

As with other insulating materials, no suitable factor of safety for electrical applications has been devised. The reason for this is that the properties are affected by varying humidity conditions and the operating conditions are not generally known. Engineers and designers are now studying the properties of this material under varying humidity conditions.

Conclusion

Micarta plate is a laminated molded product, which may have a high gloss surface or a satin finish surface depending on its application. All grades of Micarta plate for insulating purposes have good electrical insulating properties. Various grades have been developed for certain requirements but all of them do not have the same insulating characteristics.

In some cases, Micarta plate has been developed for low losses in high frequency circuits, others for low moisture absorption properties and still others for good machining and punching properties. There are different grades for various degrees of these requirements and no one grade can be recommended as the best for all of them.

The structure of this material gives uniform characteristics throughout for the requirements desired, permitting a low "Factor of safety" for the design engineer.

Unlike wood, Micarta plate is not easily destroyed by fire and is not subject to decay which greatly increases its value for permanent constructions.

It has a great advantage over ceramic insulating materials and other insulating materials of this type in that it can be machined or turned readily and punched easily in the thinner sizes.

Recent Activity in the Synthetic Resin Field

A Short Review of Contemporaneous Patents

(*Continued from page 21, January 1932*)

By Carl Marx

Editor, Plastics & Molded Products

ALMOST from the beginning of the phenol resin industry, many attempts have been made to get water-white or at least very light colored resins, particularly such as would not become darker with age and under the influence of light. Such a process is the subject matter of a patent granted July 28, 1931 to Richard Hessen, of Bautzen, Germany on an application filed Nov. 3, 1928, but which relates back to September 2, 1926 when the inventor filed an application in Germany. In the patent, U. S. P. 1,816,255 he discusses some of the equilibrium conditions that underlie the condensation of phenols and aldehydes. He states that if a product is obtained which contains no excess phenol, that it will be highly resistant to changes by light. His process is substantially as follows:—

Equimolecular amounts of phenol or cresol and formaldehyde are refluxed in the presence of a basic contact substance until layers are formed. After cooling down, the resinous layer is separated from the aqueous layer and one fifth to one fourth of the originally employed quantity of formaldehyde is added. The resin dissolves, as a rule, in the formaldehyde to a clear solution its color being inversed. The batch is now heated until layers are formed. The separated resin is again separated from the upper aqueous layer, again ⅓ to ¼ of the formaldehyde originally employed is added and the solution is boiled as above described. After this operation has been carried out a few (2 to 4) times, a resin is obtained in which no more phenol can be tested. As by the repeated additions of formaldehyde, and the subsequent separation of water, the basic contact substance is partially removed, any desired fraction of the originally employed or any other basic contact substance may be added after the addition of formaldehyde, i. e. before each reaction, should the reactions, i. e. the formation of layers, not take place as rapidly as desired. For neutralizing the base finally remaining in the resin any desired inorganic (except nitric) or organic acid or other acid substances may be added. Thereupon the resulting salt is removed by extraction with water. This may be effected according to the counter-current principle or simply by repeated washing with fresh quantities of distilled water. If the resulting salts are insoluble in water the product is dissolved in alcohol, the insoluble salts are filtered off and the filtrate is evaporated. The resins thus obtained are relatively thin fluids and are easily freed from water by evaporation. The solid resins are clear as water, soluble in alcohol, acetone, caustic soda solution etc. and may be hardened by applying temperatures beginning from 60° C. There are but two claims.

Chlorinated Plasticizers

A few of the hitherto described phenolic condensation products have been plasticized by the addition of halogenated hydrocarbons such as chloronaphthalenes. These are more or less irritating to the skin of those working with them. Rudolf Engelhardt, of Leverkusen, Germany, has found a way of overcoming this difficulty by the expedient of mixing these chlorinated hydrocarbons with pitch, or with magnesium oxide, paraffin wax, or urea. He describes his invention in U. S. P. 1,820,607; granted Aug. 25, 1931, filed March 30, 1927 (Germany April 12, 1926), and which is assigned to the I. G. Farbenindustrie A.-G. For instance 100 parts by weight of tetrachlornaphthalene are mixed by stirring for several hours with 10 parts by weight of paraffin wax and 5 parts by weight of magnesium oxide. The product is non-irritating and has the desired physical properties.

Or 100 parts by weight of tetrachoroluol are fused whilst stirring together with 9 parts by weight of pitch and 2 parts by weight of urea.

Resin From Sugar

Another process that relates to a sugar resin is controlled by the Continental-Diamond Fibre Co., of Newark, Delaware and consists of the condensation product of a water-soluble carbohydrate and phenols. It is the invention of James McIntosh, of Norristown, Pa., and as described in U. S. P. 1,820,816, granted Aug. 25, 1931 (filed eleven years ago, Aug. 19, 1920). The claims, as can readily be imagined from the very early filing date, are broad, and cover, for example "a hard, infusible, insoluble synthetic resin comprising the final reaction product of a phenol and

a water-soluble carbohydrate" and "The process of producing reactive resinous material which comprises reacting a water soluble carbohydrate with a phenol whereby reactive resinous material is formed." If this means just what it says, then sugar-phenol resins are tied up for seventeen years. The process is extremely simple. For instance the ingredients are mixed in the proportion of 1 molecule of a phenolic body to one molecule of a carbohydrate such as dextrose, but in a typical case it is best to dissolve one hundred grams of phenol and one hundred grams of dextrose in a suitable solvent such as one hundred grams water, together with a suitable catalytic agent, such as from ten to twenty drops of sulphuric acid in the case specified.

The above mixture is then boiled from five to six hours under a reflux condenser, at the end of which time the liquid on standing, separates into two layers. The top layer is then drawn off and after being washed with water to remove all traces of the catalytic agent, consists of a dark, mucilaginous or semi-solid material constituting an initial condensation product. It is then soluble in alcohol, acetone, benzol, etc.

When subjected to further condensation by being heated to a temperature of about 125° C. for from ten to twelve hours it will change to its solid form in which it is infusible at all temperatures and insoluble in the ordinary organic solvents such as those above noted.

Applications

It may be used in the manufacture of molded articles, etc. as well as employed for any of the purposes for which other phenolic condensation products are now utilized, being especially valuable as a shellac substitute. When in the initial or semi-solid stage it may be employed as a base in the manufacture of varnish and may be used for the impregnation of vulcanized fibre or fabrics in sheet, tube, block or rod form.

Cyclohexanone Resins

Quite a different type of resin is that described in U. S. P. 1,823,127 (granted Sept. 15, 1931; applied for October 11, 1926 with a German priority date of Oct. 21, 1925) by the inventors, Otto Schmidt, Karl Seydel and Nikolaus Roh. The patent is assigned to the I. G. and concerns itself with condensation and polymerization products of cyclohexanone and methyl - cyclohexanone. The products are artificial resins that may be used for the production of lacquers, molded products, and are compatible with cellulose esters. For example 100 parts of cyclohexanone are mixed with 200 parts of methyl-cyclohexanone and boiled for from 14 to 20 hours under ordinary pressure under a reflux-cooler, after a concentrated solution of 100 parts of caustic potash in methyl alcohol has been added. The bulk of the methanol is then distilled off at about 120° C. and the rest thereof is removed by introducing steam into the mixture. The alkali lye is removed and the resin poured into water. After being cooled, it is powdered and washed with water containing some hydrochloric acid until all alkali is removed. It is then molten in vacuo in a vessel heated by a heating bath of a temperature of about 160° C., and maintained at the said temperature, until practically no oily liquid distils over. The resin is then allowed to cool, for example after being poured on a sheet-metal. The resin so obtained is readily soluble for example in linseed-oil, cyclohexanone, benzene or mixtures of ethyl alcohol with other solvents.

The five claims may be summed up by claim 2 which reads

"The process of producing artificial resins which comprises condensing a mixture of a cyclic ketone with another cyclic ketone and a cyclic alcohol by means of a condensing agent.

The aminoplastics are also represented in the present review by a patent issued to Pollopas Limited, a British Co., on an application filed by Kurt Ripper on September 22, 1925, as based on an earlier application in Austria Oct. 1, 1924. The patent, U. S. P. 1,817,940 relates to the treatment of condensation products of carbamide (urea) with aldehydes. Ripper has found that the so-called insoluble products derived from the condensation of urea and aldehydes can be rendered sufficently dispersed so as to lend themselves to molding operations by the expedient of grinding them and acting upon them with solvents. The utilization of waste material of this kind is thus made possible. It is not essential that a solvent be used, but merely that the fine particles of the ground or otherwise comminuted "insoluble" product be intumesced or swollen by the fluid employed. The resultant mixture can then be molded. The process may best be exemplified by quoting claim 6 (there are 13 in all, some of them relating to "An artificial formed mass of a performer and resoftened and resolidified urea-formaldehyde condensation product"). Claim 6 reads

"A process for the treatment of solid condensation products of a urea with formaldehyde consisting in transforming the condensation products into the sol condition by the action of solvents having acid properties in the presence of heat, precipitating a powdery mass from the resulting solution on cooling, washing and drying the resulting precipitate, incorporating it with an amount of organic solvent insufficient to dissolve the condensation product and molding the resulting product by the application of heat and pressure."

MOLDER AND ASSEMBLER OF PLASTIC PRODUCTS GAIN PRODUCTION SPEED AND ECONOMY BY MAKING FASTENINGS WITH SELF-TAPPING SCREWS

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The illustration indicates the wide variety of products which are molded or assembled better and more economically with Self-tapping Screws. And the applications are rapidly growing. Molders are recommending these unique Screws to their customers as a means of reducing costs, without sacrificing quality. Manufacturers who assemble molded, cast, and laminated plastic products see the advantages of the Screws, and use them wherever practicable.

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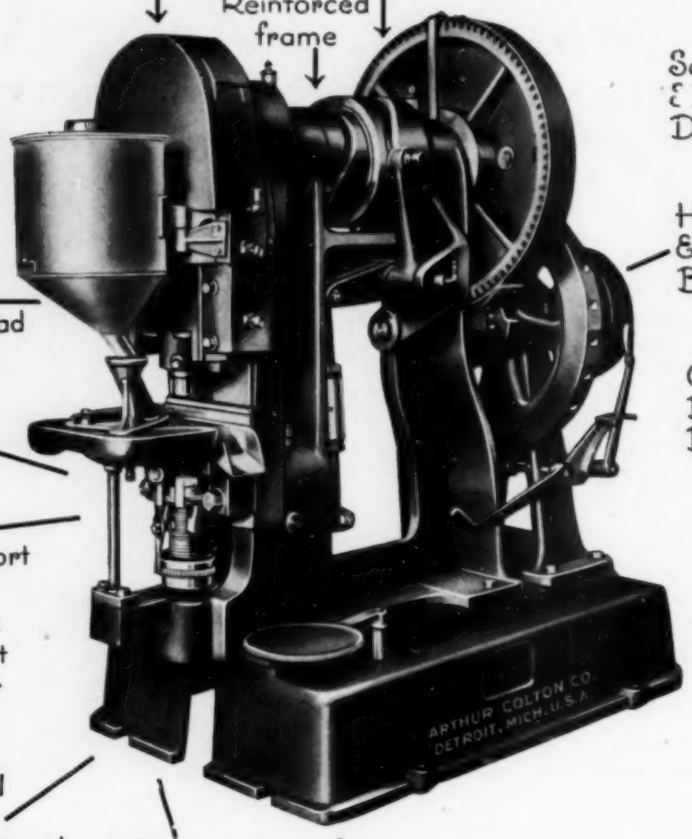
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NEWS *of the* INDUSTRY

Spencer of Durez Addresses Molders at Last Buffalo Meeting

THE outstanding feature of the last Molded Insulation Section meeting, held in Buffalo, December 4th, was Mr. H. S. Spencer's address on "Cooperative Association Advertising," Being advertising manager of General Plastics, Inc., one of the molding industry's sources of supply, Mr. Spencer has been close to the trade promotion problems of the industry and his comments were highly instructive. The membership of the Section voted Mr. Spencer its thanks, and more than that, set proper committees to work on the details of some of his recommendations.

Committees Organized

Chairman Woodruff, who presided at the meeting, announced that the Section's organization, after the recent elections, had been completed. The personnel of the standing committees, which will handle the detail work of the Section, is as follows:—

Advisory: Douglas Woodruff, chairman; B. E. Schlesinger, S. M. Stone, Prescott Huidekoper.

Trade Practices: J. B. Neal, chairman; E. F. Bachner, J. P. Case, R. W. Post, F. H. Shaw.

Accounting Practices: R. A. Austin, chairman; G. C. Wilson.

Membership: G. C. Wilson, chairman; B. F. Conner, Donald Dew, C. A. Kurz, Jr., J. G. Rossiter, B. E. Schlesinger, G. K. Scribner.

Technical: F. H. Shaw, chairman; R. H. Allen, G. K. Scribner.

Trade Research: H. D. Randall, chairman; B. F. Conner, W. A. Freyer, J. B. Neal, R. W. Post, W. L. Kelley, J. G. Rossiter.

The Section decided upon holding meetings hereafter at regular intervals. It was unanimously approved that regular meetings be held on the third Friday of each even month. Hereafter all committees will meet in the morning of the day set for the regular meeting and the entire Section will meet in the afternoon. This arrangement promises to bring full attendance to the committee meetings and prompter action by the Section as a whole on the various committees' findings. The next meeting of the Section will be held in Buffalo, N. Y., Friday, February 19, at the Hotel Statler.

Announcement was made of the endorsement of the Niagara Insul-Bake Specialty Company's application for membership by NEMA'S Board of Governors. The membership application of the Kuhn & Jacob Moulding & Tool Co., Trenton, N. J., was submitted to the Section chairman for approval before being forwarded to the NEMA membership committee.

Members present at the December meeting were:—

American Insulator Corp., Prescott Huidekoper; Auburn Button Works, Douglas Woodruff, W. A. Freyer; Boonton Molding Co., G. K. Scribner; Boonton Rubber Works, R. W. Post; Chicago Molded Products Corp., E. F. Bachner; Diemolding Corp., Donald Dew; Kurz-Kasch Co., C. A. Kurz, Jr.; Northern Industrial Chemical Co., B. E. Schlesinger; Norton Laboratories, Inc., J. B. Neal, G. C. Wilson; Reynolds Spring Co., J. G. Rossiter.

Others present were H. S. Spencer, General Plastics, Inc.; E. S. Aumend, NEMA; A. B. Van Horn, Ronald Kinnear, Niagara Insul-Bake Specialty Co., R. C. Gilmore, Jr., Plastics Publications, Inc.

Catalin Stops Process Suit Against Marblette

MR. THIELE, President of American Catalin Corporation appeared before Justice Schmuck of the Supreme Court January 12th, 1932, and stated that his corporation wished to discontinue its suit against The Marblette Corporation.

Justice Schmuck immediately rendered a decision whereby the suit was discontinued, and allowed costs to The Marblette Corporation.

Synthane Appoints Mid West Representative

SYNTHANE Corporation, Oaks, Pa., manufacturers of Synthane Laminated Bakelite, sheets, rods, tubes, fabricated parts and stabilized gears, has appointed Industrial Products Sales Corporation, 7307 Natural Bridge Road, St. Louis, Mo., as sales representative for St. Louis and the surrounding territory.

Synthane Corporation also maintains representatives in Philadelphia, New York, Cleveland, Chicago, Boston, Detroit, New Orleans, Atlanta, Minneapolis, Los Angeles, San Francisco, Dayton and Pittsburgh.

Kuhn & Jacob Change Firm's Name

KUHN & JACOB Moulding & Tool Co., is the name under which the Trenton, N. J. custom molders will do business from now on. This change is significant of the fact that their principal business is the molding of plastics. They will continue, however, to build molds for plastics, porcelain and hard and soft rubber, as heretofore.

Plastics Industry will Exhibit at A. M. A. Packaging Exposition

THEFT - PROOF, waterproof and air-tight packages of paper, glass, wood metal, plastic and Cellophane — from the raw material state through to the delivery of shipping units of the packaged commodities— will be on display in a series of exhibits at the Packaging, Packing and Shipping Exposition to be held in the Palmer House, Chicago, March 7-12 inclusive. The Exposition is sponsored by the American Management Association, and is being staged in connection with a week's conferences and clinics on production packing and shipping, packaging and consumer marketing.

Materials, package, container and packaging manufacturers, and those engaged in packing and shipping, the products and mthods of whom have had definite application to current merchandising and distribution, are eligible participants in the Exposition. The conference and clinic will deal with the problems of the package designer and manufacturer, the packager, the distributor, the retailer and the consumer.

Among the companies that plan to exhibit at the Packaging Exposition are Bakelite Corporation, Celluloid Corporation, General Plastics, Inc., materials suppliers, and Norton Laboratories, Inc., custom molders.

Patterson Eng'g. Corp. Will Make Hydraulic Machinery

ANNOUNCEMENT was recently made of the formation of a new company, the Patterson Engineering Corporation, Akron, Ohio, which will manufacture machinery and equipment for the plastics, rubber and allied industries. It is an affiliate of the Patterson Foundry & Machine Co., E. Liverpool, Ohio.

President of the new company is Richard L. Cawood. Associated with him as vice-president and secretary-treasurer respectively are P. E. Walton and R. B. Koontz. Both have been long identified with the industry, the former as a mechanical engineer and the latter as an executive for many years with the Adamson Machine Co.

Unyte Corp. Plant at Grasselli is Equipped for Making Urea Plastics

DURING the last twelve months or so the Urea-Formaldehyde type of resin has made great strides in this country, and it is, therefore, of particular interest to the industry that Unyte Corporation announces that it is now on a production basis.

First news in regard to this newcomer in the field of plastics was made in the early part of 1931. The statement was made that Unyte Corporation had been formed to acquire the numerous patent rights and processes relating to the field of Urea resins from the I. G. Farbenindustrie, Frankfurt am Main, Germany, the Ellis-Foster Company and Carleton Ellis of Montclair, N. J.

The I. G. Farbenindustrie has long had a particular interest in Urea resins for besides being the largest manufacturers in the world of dyestuffs and pigments which play such an important part in the production of resins of this nature, they are also the world's largest manufacturers of the basic raw material, Urea.

While manufacture of Urea-Formaldehyde compositions is theoretically comparatively simple, the practical details of the process are closely guarded secrets, and the present method of manufacture is the result of much careful work in the German chemical laboratories and in the Ellis-Foster Co., laboratories at Montclair.

Carleton Ellis, author of the standard volume "Synthetic Resins and their Plastics," needs no introduction to American industry. His research work on Urea resins extends over a period of some 14 years. and the Ellis patents are among the earliest in this field to be granted by the United States Patent Office.

Unyte Corporation have just completed the equipment on a large specialized plant, located at Grasselli, N. J., and the company announcement will be of particular interest to molders and users of molded products.

Materials are offered in the form of granulated or sheeted stock. Controlled flow, extra rapid cure, stability during storage, and shades that are fast to light are said to characterize Unyte molding materials. The properties combined in these molding compositions are said to offer economy and reliability in operation and claim to satisfy the demand for quality and attractive appearance which are today more than ever appreciated.

FRENCH trade in plastics, and plastic materials during nine months of 1930 and 1931 is shown in the following table:

	Exports		Imports	
	Jan.-Sept. 1930	Jan.-Sept. 1931	Jan.-Sept. 1930	Jan.-Sept. 1931
Base	Kilos	Kilos	Kilos	Kilos
Pyroxylin	107,060	85,950	24,820	25,140
Casein	157,240	125,570	1,430	2,970
Synthetic resins	3,840	6,800	33,720	52,130
Total	268,140	218,320	59,970	80,240

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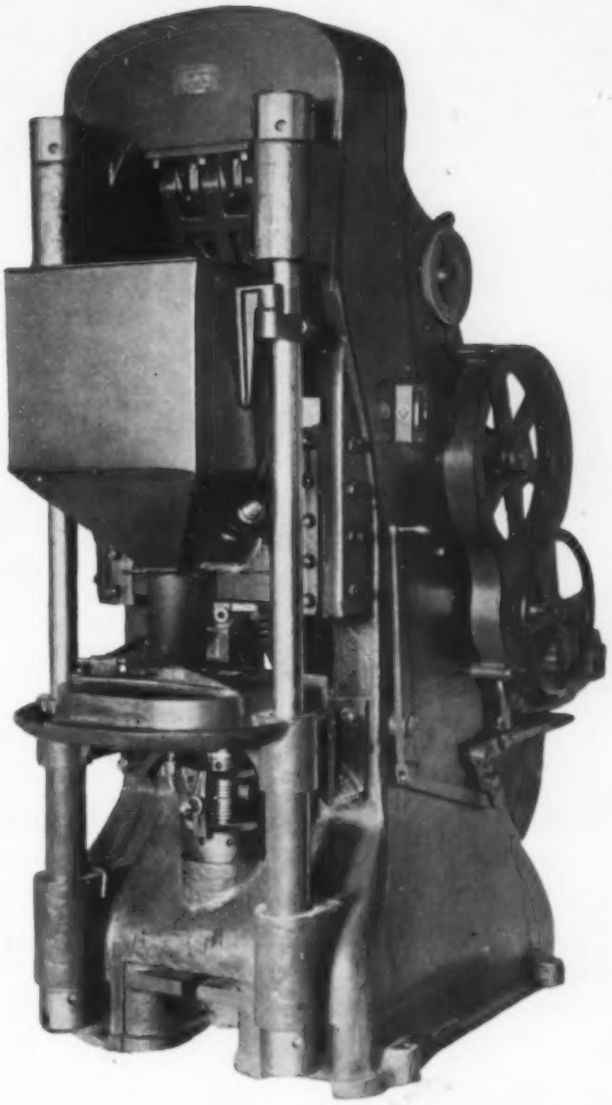

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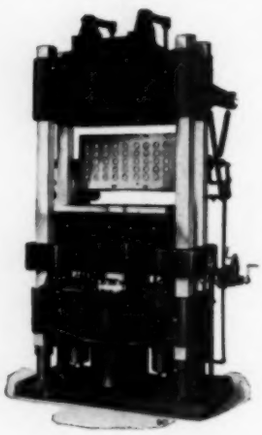

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The Machining of Laminated Plastic Materials

By L. L. Howard

Continental-Diamond Fibre Company

THE uses of laminated phenolic materials having been greatly extended during the past few years owing to the versatility of useful applications to which they may be applied is a fact generally known among manufacturers of technical apparatus. This increased use has frequently brought demands, from those not familiar with the material, for information to enable them to judge whether or not laminated phenolic products could be used in their own particular industry. To a large extent, the use of any material in any application is governed by the methods by which it must be handled and, by the same token, the increase or decrease of the usefulness of any material in any service is dependent on the correct or incorrect methods being used in preparing it for that service.

In spite of its vast use, a comprehension of the best methods of machining laminated phenolic sheets, rods, tubes and moulded forms is not a subject of general knowledge, but is confined largely to the actual users who, in many cases, have had to create their own technique by cut-and-try methods.

It is impossible to lay down any precise rules covering the subject since many grades have been developed for particular uses where certain features in the material itself are required. Variations in these grades are caused by varying requirements of either flexibility, hardness, porosity, mechanical strength or electrical qualities or a combination of them, and these various grades sometimes require slightly different methods in machining.

Simplicity of Operations

It is true, however, that laminated phenolic materials, when handled properly, can be machined very easily and the most general rule to follow, when in doubt, is for a machinist to make his setup for any operation just the same as he would if he were about to machine brass or any of the soft metals, regardless of whether the operation be turning, drilling, punching, tapping or any other. This rule is valuable because it is easy to remember, but more specific information is as follows:

Band Sawing

In sawing it is usual to band saw sheets of all thicknesses for all curved cuts, but for straight cuts sheets under one inch in thickness may be, and in fact usually are, handled on circular saws.

When band saws are used, any good wood-cutting machine, rigidly made with metal table, is suitable. The saws should be run at approximately five thousand lineal feet a minute. Teeth should be sharpened straight across and sufficiently set to make a cut at least twice the thickness of the saw, thereby giving it no chance to heat except by the contact of the teeth with the materials.

Ball bearing guides should be used and care exercised to see that they are adjusted so that there is no possibility of the saw being set so far back between the jaws of the guides that it will smooth out the set of the teeth. Several saws should be on hand so that there is no delay in production during the sharpening process, which can be accomplished cheaply by the use of mechanical saw setting and sharpening machines, of which there are a number of types on the market.

Saws should be kept sharp and good results may be obtained by using saws ¼" to 1" in width, depending on the thickness of material to be cut, and the curvature of the cut. For general use saws ½" wide with seven teeth to the inch are very satisfactory.

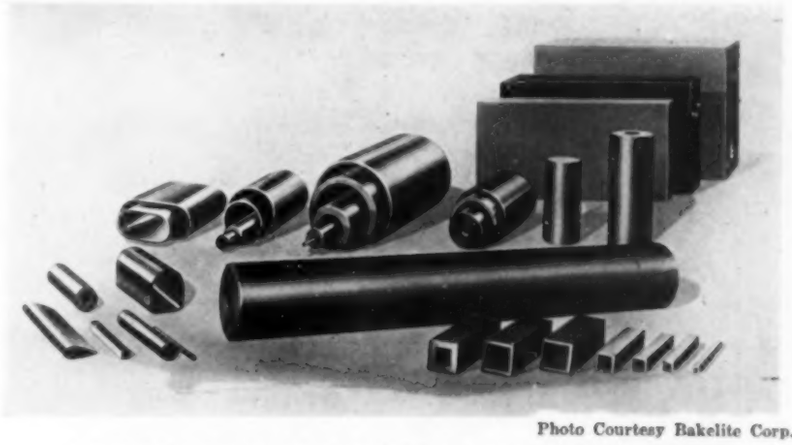
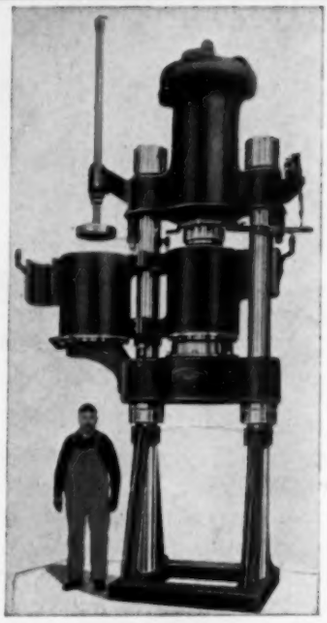


Photo Courtesy Bakelite Corp.

A Typical Group of Phenolic Resinoid Laminated Sheets, Rods and Tubes.



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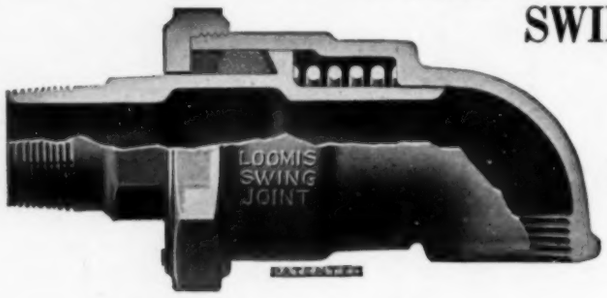

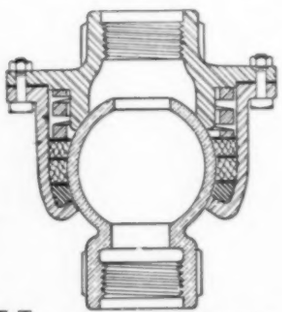

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Circular Sawing

When a circular saw is used, an all-metal wood cutting machine is desirable. Excellent results will be obtained if hollow ground, high speed steel, metal cutting saws are used. Twelve inch diameter saws should have approximately 112 teeth and should run at about 3450 RPM.

The teeth are sharpened on a 20 degree angle right and left thus creating staggered points which prevent the chipping of the edge of the material when sawing panels or strips. If a specially smooth cut is required, it is desirable to hone the sides of the saw so as to take off all burrs left on the sides of the teeth by the grinding operation.

It is advisable to keep saws sharpened frequently rather than to let them get dull and then have to grind off a lot of metal. The edges of the pieces being cut will indicate whether the saw should be sharpened, but as a general rule continuous service of one-half hour to one hour is the most that can be expected from a saw before it requires sharpening. It is advisable to have several saws on hand so that those that are dull can be sharpened while those that are sharp are being used. Efficient sharpening grinders are obtainable from several sources.

Drilling

For drilling purposes, high speed steel drills should be used. They should be ground with a liberal clearance and the rake of the drill may be removed to prevent grabbing in the material. Several drill manufacturers make drills especially adapted for cutting laminated phenolic products, but when standard metal cutting drills are used the clearance and rake should be ground as described.

Drills may be fed rapidly but not forced and should be run at high speed, as for brass, the drill being lifted out of the hole frequently so as to free it from chips and, in consequence, to reduce heating. This is particularly important when drilling deep holes parallel to the laminations for, due to the resinous nature of the material, the chips cause a good deal of friction and the heat generated causes them to become gummy quite readily if not freed from the tool. No lubrication is necessary, but it will be found to be of considerable help if a little can full of cold water is kept close to the operator and this he can lift up under the drill every now and then in order to cool it.

Turning

Metal cutting lathes are used and any good steel that is suitable for cutting metal is equally suitable for cutting laminated phenolic materials.

Tool bits should be ground without any rake but should have plenty of clearance. No lubricant is necessary. Very coarse feeds may be used and cutting speed should be approximately 400 feet per minute. If any of the tungsten carbide metals are used for bits, and these have been found to be very successful in many turning operations, the cutting speed may be increased and tool grinding will be less frequently necessary. They should be ground, however, the same as steel bits.

Punching

When making dies for punching laminated phenolic stock, punches are made to fit the dies very closely. The dies are relieved on a taper of about one-fourth of a degree up to a point below the surface of the die equal to approximately the thickness of the material to be punched plus a small amount extra to allow for grinding. In most cases about $\frac{1}{8}$" is sufficient for the cutting edges of the die to run parallel and to fit the punch, the relief starting from that point downwards.

Since there may be shrinkage in holes after the punch leaves them, it is necessary that punches should be made larger than the required dimension of the hole to be punched by an amount equal to approximately 3% of the thickness of the material being punched. Progressive type dies may be used when fast production is essential and particularly when thin stock is to be punched. However, on thicker material and where especially clean punchings are requisite, it is advisable to use a compound die. Compound dies will give good, cleanly punched pieces with each piece exactly the same. Often the lower production on this type of die is more than off-set by the quality of punchings obtained.

Preheating Stock

While it is true that excellent cold punching grades are available, it is nevertheless the case that one of the most important characteristics of laminated phenolic materials is a slight decrease of brittleness and an increase of toughness when heated. It will be found, there-

Photo Courtesy Bakelite Corp.

Varieties of Pieces Stamped and Punched from Laminated Stock.

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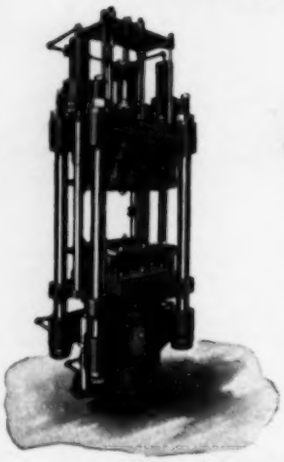

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fore, that with some of the grades characterized by their hardness, and also with thick stock of any grade, a pre-heating improves punching. In fact, in some cases, preheating makes punching possible. It is almost impossible to lay down a definite schedule of temperatures, these varying according to the piece to be punched, the material used, and its thickness. They range, however, from a slight warming to a heat of about 250 degrees F. as a maximum. It will be found that any punch press operator with average intelligence will, with a little varying of his heat, easily find the best temperature for the stock he is using, the ideal temperature being the lowest he can use and still obtain satisfactory results.

Preheating Methods

Preheating can be handled by the use of ovens or else hot plates conveniently located beside the punch press, and within reach of the operator. Strips to be punched should be heated and punched in rotation as a too lengthy heating will cause a tendency to brittleness in the material.

In designing punched parts, it is advisable wherever possible to allow between the edges of holes and the edges of the punched piece, or between the edges of adjacent holes, an amount of stock at least equal to the thickness of the stock. Also, if possible, holes should not be of a smaller diameter than the thickness of the stock to be punched. The latter is not essential but is merely desirable.

Tapping

When tapping holes, they should be drilled slightly larger than would be required if the material were metal. Either use a larger drill or else a drill of correct size, but ground somewhat off center, otherwise the operation is the same as for metal. Turpentine or light oils may be used to improve the threads.

Threading

The threading of laminated phenolic materials, when in lathes, should be accomplished with tools ground without rake but with plenty of clearance. Self-opening dies may be used if desired. Tools must be kept very sharp and the use of turpentine or a light oil will assist greatly in obtaining clean threads. Threads may be cleaned by using a fine wire brush or a stiff hair brush.

The foregoing describes a rather general technique which has been found to give satisfactory results. A slight variation of treatment may be found to be desirable according to the grade of material being handled, but any machinist with reasonable experience and a little imagination will have no difficulty at all in making such slight changes as are necessary for the easiest and most efficient handling of whatever grade of laminated phenolic material he may be using.

Marketing Laminated Plastics

(*Continued from page 63*)

results will be striking to those not familiar with the laminated. Mechanical qualities only are being discussed as it is the mechanical uses that will supply the big volume of future business to a far greater extent than has been the case with compound.

Comparative Strength

In general, the weakest grade of laminated is stronger than the strongest grade of compound. The spread from the weakest to the strongest grades of laminated is much greater than the similar spread of compounds. The transverse or bending strength of laminated can be made as high as mild steel. One grade of material was made with a bending strength of nearly 40,000 pounds per square inch. That, however, was the result of an unusually pressing situation. It is a story in itself. The material served its purpose and passed out, like an actor on the stage.

By manipuation of the fibre in the sheet, a wide variety of mechanical properties can be secured. By manipuation of the treated sheet, a wide variety of sizes and shapes of products can be obtained. Plate is now made in four by eight feet in size. A method of multiplying the length of the plate to nearly any extent has been worked out. Trays and pans with rims have been made in large quantities. It would not take a very strong imagination to see a complete door surface formed in one piece. The head piece of a bedstead could be made of simple steel construction and covered by a continuous plate of formed, laminated stock.

Consider a row boat or canoe. The big problem is to protect the body material from the water by paint or other substance. Make the body from a strong, tough, laminated stock, formed to shape, and little protection will be needed. Laminated is an ideal finishing material for large boats or any other structure that is exposed to extremes of moist air. Aircraft is a natural field of use for this material and it is certain to have a big place in future production programs when some manufacturer gives proper study to the subject. Bodies and body parts, pontoons, control vanes, all such parts could be greatly improved by applying this material, with proper adaptation to the articular needs of such parts.

Some Present Uses

Floor surfaces, window sills, chair bottoms, desk tops, table tops, panels, all these and scores of other places are possible big markets for this product. Why it is not used more at this time. is difficult to understand. In developing new uses and adapting the product to such uses, the compound people have been far

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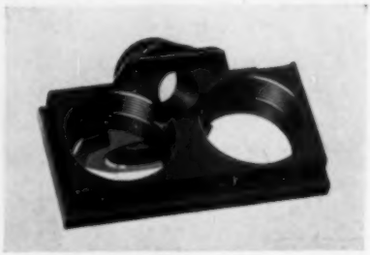

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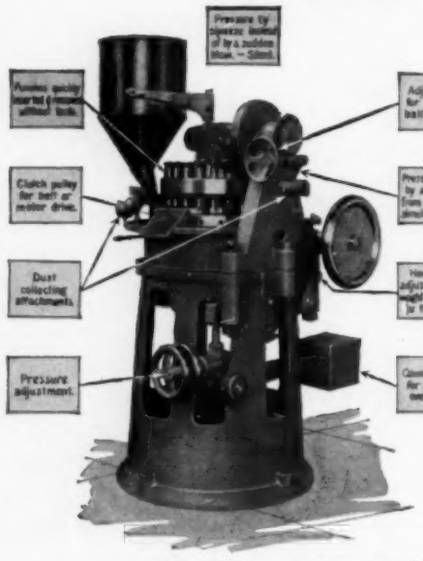

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Type Cases

Unless the present manufacturers take a more energetic attitude toward the subject of new uses, it is very likely the prospective user will develop the manufacture in his own plant. In one case, one of the laminators sent a representative to call on two of the largest users of a certain article, to learn if they would be interested in having it made from laminated. Both were deeply interested and one was on the verge of starting his own force on that identical problem. He was very willing to drop the matter, if the laminator would agree to push the work actively. It has since become a large and profitable account to him. In another case, a company, not in position to do the work for itself, came to a laminator and offered to pay for all the development if they would try to make the article from laminated to their specifications. This article has also become a valuable business and is being sold to a large number of customers. Other laminators are now taking it up.

A much better attitude for the laminators would be to canvass all fields so thoroughly that no possible user would have to search them out. The possible range of uses for laminated is much wider than for compounds and the prospective business a great deal larger. This larger activity will facilitate the lower cost necessary to secure the big volume of business. Methods of reducing the cost are being studied keenly. Raw material costs are coming down and ways of using cheaper ingredients are being found.

All that is needed to put the laminated product over big, is more courage on the part of manufacturers in going through with big development programs. The field is ready and waiting for anybody with enough courage to occupy it.

New Fields for Laminated

(*Continued from page 66*)

Prohibition has had the effect of causing liquids of considerable alcoholic content to be spilled over the furniture in hotel rooms, and the alcohol is deadly to varnish and lacquers of the ordinary kind.

Such furniture has been traditionally protected by plate glass but this, of course, breaks occasionally and also liquids spilled on it run down under the glass and remove the finish.

Due to its resistance to alcohol, laminated material like Formica has solved the problem of keeping a satisfactory finish on this furniture without the necessity of protecting the top with glass. In some cases it has been found economical even where the glass was used to insert a sheet of Formica under it so that liquids will not take the varnish off.

Laminated phenolic sheets are now offered in more than 30 colors and patterns by this company. Some of these are plain colors like black, brown, tan, green, red, etc. Some are figured like Verde Antique, or Belgian Marble, and some have designs of various kinds on them —cretonne figures or modernistic color splashes.

A great many architects have been attracted by this new material and where the modernistic note is to be struck, it has been quite widely used by some of the leading American designers. They have applied it as wall covering, as paneling for counters, and for tops in banking rooms, railway ticket offices and lobbies of public and industrial buildings.

Needless to say, the introduction of colors and figures in a material that formerly was available only in black and tan has given rise to many research problems, some of which have been solved but many more of which are still in the process of solution.

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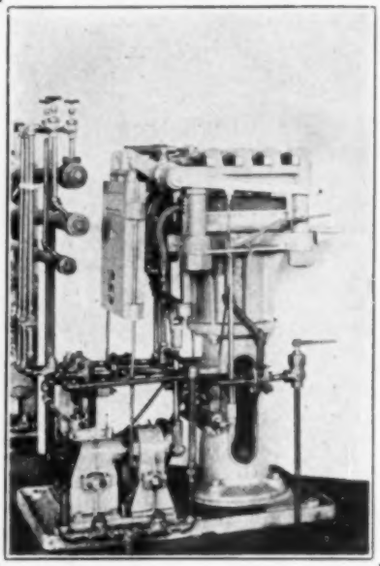

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TECHNICAL ABSTRACT SECTION

A Review of Literature and Patents

Recovery of Cellulose Acetate From Acetic Acid Solutions. Hans T. Clarke, of Rochester, New York, Assignor to Eastman Kodak Company, of Rochester, New York. U. S. P. 1,823,348; Sept. 15, 1931.

Cellulose acetate may be recovered from its solutions in acetic acid in the form of soft clumps, fibers or shreds, which can be readily disintegrated and washed, by precipitating said solutions into an aqueous bath containing over 20% of acetic acid. A thorough precipitation of the cellulose acetate takes place even if the acetic acid in the aqueous precipitation bath reaches 50%. It might have been expected that wasteful amounts of cellulose acetate would remain in solution in such a strong concentration of acetic acid, but the actual loss is negligible.

The bath liquor from which the precipitate was removed contains about 50% of acetic acid and contains practically no dissolved cellulosic material. It is, therefore, in excellent condition for reconcentration, say to glacial acetic acid for further acetylation of cellulose. Such reconcentration, can, for example, be carried out by the process disclosed in patent application 232,916, filed November 12, 1927, Hans T. Clarke and Donald F. Othmer, processes of removing water from aqueous acetic acid. In said process ethylene dichloride is mixed into the aqueous acetic acid solution and an azeotropic mixture of water and ethylene dichloride is distilled off.

Manufacture of Cellulose Acetate Lloyd M. Burghart, of Baltimore, Maryland, Assignor to U. S. Industrial Alcohol Co., of New York, N. Y. U. S. P. 1,822,563; Sept. 8, 1931.

The process which comprises treating cellulose with an acetylating mixture containing liquid sulfur dioxid, to produce cellulose acetate, and then introducing a hydrating agent and subjecting the cellulose acetate in the presence of the liquid sulfur dioxid to further treatment to convert the cellulose acetate to a form soluble in acetone.

In the manufacture of cellulose acetate, the step of hydrating cellulose acetate in the presence of liquid sulfur dioxid.

The method of manufacturing cellulose acetate which comprises subjecting the material to an acetylation in the presence of a medium comprising liquid sulfur dioxid, and then proceeding with a hydration treatment in the same medium.

Cellulose Fiber for Preparation of Esters. George A. Richter, of Berlin, New Hampshire, Assignor to Brown Company, of Berlin, New Hampshire. U. S. P. 1,821,321; Sept. 1, 1931.

A process of modifying the characteristics of cellulose fiber, which comprises treating the fiber with a caustic soda solution of mercerizing strength, ageing the treated fiber to effect a depolymerization thereof, washing the fiber, and dissolving non-alpha cellulose components from the washed fiber in an alkaline solution.

A process of modifying the characteristics of cellulose fiber, which comprises treating the fiber with a caustic soda solution of mercerizing strength, ageing the treated fiber to effect a depolymerization thereof, washing the fiber, digesting the fiber in an alkaline solution, and washing the digested fiber.

Artificial Material. Leon Lilienfeld, of Vienna, Austria. U. S. P. 1,820,811; Aug. 25, 1931.

Process for manufacturing artificial materials from viscose, which comprises causing a viscose, prepared from an alkali cellulose which has been allowed to mature only from naught to 48 hours, to pass through suitably formed openings into a coagulating bath containing at least 55 per cent, of sulphuric acid monohydrate and keeping the bath at a temperature below room temperature.

Preparing Cellulose Nitroacetate. Wilhelm Walter, of Cologne-Niehl, and Ludwig Lock, of Dormagen, Germany, Assignors to I. G. Farbenindustrie Aktiengesellschaft, of Frankfort-on-the-Main, Germany. U. S. P. 1,819,397; Aug. 18, 1931.

Example 1

1 part of cellulose is heated at 70° with 6 parts of acetic anhydride, 4 parts of glacial acetic acid, 0.05 part of ammonium nitrate and 0.005 part of sulfuric acid with the addition of 0.03 part of urea until a test portion is found to be soluble in chloroform. The nitrogen content is 0.01%. By hydrolysis according to one of the known processes the product can be converted into a nitro acetate possessing the desired solubility, for example, in acetone.

Example 2

1 part of cellulose is heated at 85° C. with 3 parts of acetic anhydride, 5 parts of glacial acetic acid, 0.04 part of ammonium nitrate and 0.003 part of sulfuric acid with the addition of 0.015 part of urea until a test portion is found to be soluble in chloroform. The nitrogen content is 0.02%.

The further working up of the primary acetate into a cellulose nitro acetate possessing the desired solubility can be carried out by any of the known methods.

Process of Etherifying Cellulose Frederick C. Hahn, of Wilmington, Delaware, Assignor to E. I. Du Pont De Nemours & Company, of Wilmington, Delaware. U. S. P. 1,819,600; Aug. 18, 1931.

In a process of etherifying cellulose to obtain a cellulose ether wherein the cellulose is treated with an alkali and an alkyl compound, the procedure comprising completing the grinding of the cellulose apart from the alkali, then adding it to a slurry of alkali in a inert liquid and intimately mixing it therewith, and thereupon etherifying it.

The Digestion of Nitrocellulose. Mahlon G. Milliken, of Parlin, New Jersey, Assignor to Hercules Powder Company, of Wilmington, Delaware. U. S. P. 1,818,733; Aug. 11, 1931.

Nitrocellulose, after removal from the nitrating bath and washing for the removal of acids, is forced under pressure together with water through a restricted passage, as a coil of relatively small cross section and having a restricted outlet, provided, for example, by a needle valve. The mixture of water and nitrocellulose pass through the coil together at a relatively high velocity and at a regulated temperature. On passing out of the coil the nitrocellulose may be subjected to such further treatment as is desired.

Further the invention contemplates the provision of means for supplying additional water to the mixture of nitrocellulose and water at a point adjacent the outlet from the coil, thus facilitating discharge of the nitrocellulose-water mixture and avoidance of jamming and at the same time assisting in washing out acid from the nitrocellulose and hence promoting its stability.

Manufacture of Cellulose Acetate. Henry Dreyfus, of London, England. U. S. P. 1,829,822; Nov. 3, 1931.

Process for the manufacture of cellulose acetate, characterized in that the acetylation of cellulose is performed with acetic anhydride and a bisulphate containing a small proportion of free sulphuric acid in presence of a quantity of acetic acid over 8 times the weight of the cellulose, the acetylation being started at a temperature between about 0° C. and ordinary temperature.

Process for the manufacture of cellulose acetate, characterized in that the acetylation of cellulose is performed with acetic anhydride and a bisulphate containing a small proportion of free sulphuric acid in presence of a quantity of acetic acid over 8 times the weight of the cellulose, the acetylation mixture being precooled to below ordinary temperature and the temperature not exceeding about 35° C. during acetylation.

Method of Manufacturing Composite Mica Sheets. Henry W. Cooper, of West Newton, Mass., assignor to New England Mica Co., of Waltham, Mass. U. S. P. 1,829,981; Nov. 3, 1931.

The method of manufacturing a

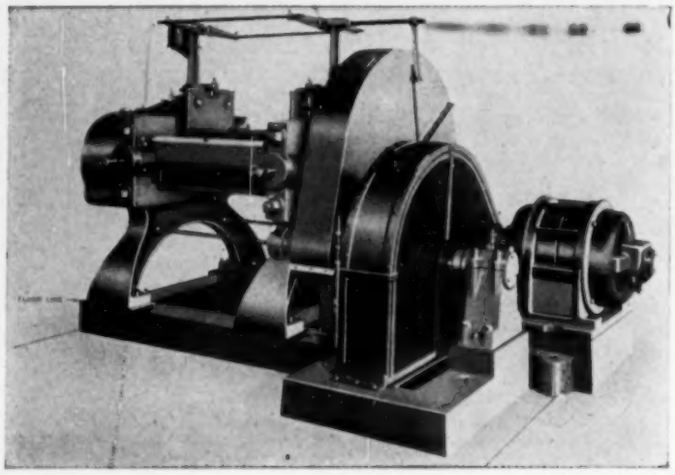

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plate of stratified mica films which comprises building up a layer of dry mica films to the desired thickness, immersing said layer of mica films in a bath of liquid binder while holding the layer between coverings of foraminous material to retain the films against relative displacement while permitting the binder to permeate through the layer, and then subjecting the layer to pressure while still between said coverings.

Method of Applying Pyroxylin Sheeting. George F. Metz of Yonkers, New York. U. S. P. 1,830,236; Nov. 3, 1931.

The method of covering parts of an article with a coating sheet, which consists in forming a sheet of celluloid, having substantially the same length as the part of the article to be covered therewith and a width substantially equal to the periphery of the said part, then softening the sheet, then wrapping the said sheet about the said part with the longitudinal elements of the sheet positioned parallel to the length of the said part, thereby causing the longitudinal edges of the sheet to meet each other in a line which is substantially parallel to the length of said part, then cementing the edges of the coating sheet to each other and thereupon permitting the said coating to harden and shrink on to the said part.

Process for the Production of Phenolic Resinoid Varnish and Enamel-Like Coatings. Albert Jaeger, of Stade in Hanover, Germany, assignor to "Herold" A. G., of Hamburg, Germany. U. S. P. 1,830,906; Nov. 10, 1931.

In the production of a varnish-like coating, the steps comprising combining water glass with the liquid phase of phenol formaldehyde condensation in the presence of a protective colloid selected from the group consisting of resin-esters, cellulose esters, artificial resins, albuminous substances, and gelatinous substances, the colloid being used in a sufficient quantity to prevent precipitation of silicic acid.

The process of producing a resinous coating composition comprising mixing water glass in the presence of a protective colloid dissolved in an organic solvent with the liquid phase of phenol formaldehyde condensation, said colloid being used in a sufficient quantity to prevent precipitation of silicic acid, and heating the resulting mixture until a mass is obtained capable of hardening into a resinous product.

Production of Colored Cellulose Plastics and Solutions. Carl Immerheiser and Ernest Knebel, of Ludwigshafen-on-the-Rhine, Germany, Assignors to I. G. Farbenindustrie, A. G. of Frankfort-on-the-Main, Germany. U. S. P. 1,830,944; Nov. 10, 1931.

It is possible to incorporate large quantities of coloring matters with celluloid or with other compositions made from cellulose esters or ethers in such a manner that the said color-

ing matters are in so finely divided, practically colloidal state that they do not separate out to any appreciable extent from solutions of the celluloid or other composition in solvents incapable of dissolving the said coloring matters, even when the solutions are diluted and kept for a long time. For example, the amount of coloring matters which can be incorporated with the celluloid or other composition may be 25 per cent or more and may even exceed the amount of the cellulose composition present.

Example 1

100 parts of a celluloid composition consisting of about 2/3 of a nitrocellulose with about 11 per cent of nitrogen, and about 1/3 of camphor, are rolled out thinly from 10 to 20 times with 200 parts of lithol fast scarlet R (see Schultz, Farbstofftabellen, 6th edition, p. 32, No. 73). 3 parts of the resulting composition are dissolved in a solution of 9 parts of celluloid in 88 parts of a solvent such as butyl- or amyl acetate, ethylene glycol monoethyl ether or the like. In this way a solution is obtained which contains 2 parts of coloring matter in a highly dispersed condition for every 10 parts of celluloid. Consequently, of 12 parts of the solid contained in the lacquer ready for use, only 3 parts were subjected to mechanical treatment.

The celluloid may be replaced by analogous compositions made from nitro- or acetyl celluloses.

The lithol fast scarlet may be replaced by other organic pigment colors, or also by earth and mineral coloring matters such as colcothar, terra di Siena, Berlin blue, and the like.

Process of Lowering the Viscosity of Cellulose Acetate. Leonard E. Branchen and Chauncey U. Prachel of Rochester, New York, assignors to Eastman Kodak Company, of Rochester, New York. U. S. P. 1,831,795; Nov. 10, 1931.

Process for the reduction of the viscosity of cellulose acetate which comprises subjecting comminuted cellulose acetate which is substantially free from volatile solvents to a temperature of 120° to 180° C.

Process for the reduction of the viscosity of cellulose acetate which comprises subjecting comminuted cellulose acetate which is substantially free from volatile solvents and having a particle size of approximately 1/300 of an inch in diameter or less to a temperature of 120° to 180° C.

Process for the reduction of the viscosity of cellulose acetate which comprises freeing the cellulose acetate from substantially all solvents, simultaneously sub-dividing to a highly comminuted form and subsequently subjecting the solvent-free and comminuted cellulose acetate to a temperature of approximately 150° C.

Hydraulic Mold and Press. Harold E. Hammer, of Dallas, Texas. U. S. P. 1,832,020; Nov. 17, 1931.

A molding press of the character described comprising upper and lower fluid-actuated rams, a stationary platen carried on the upper ram, a

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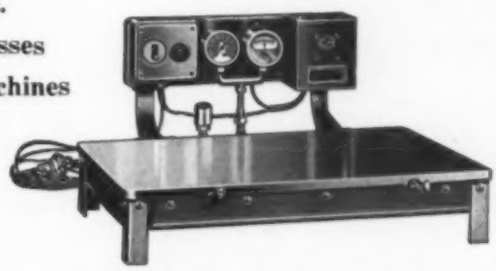

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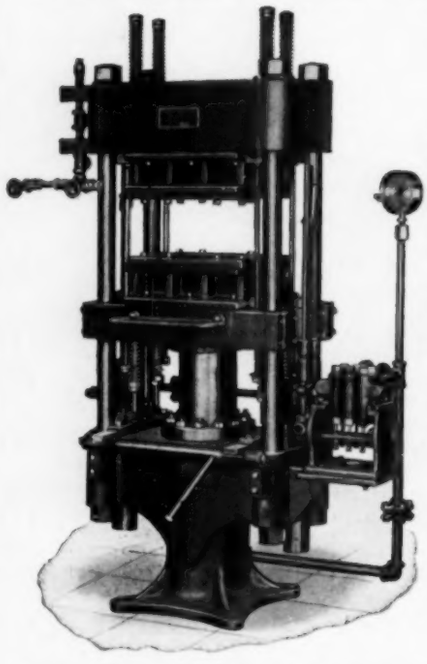

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movable platen on the lower ram, a bed plate and portion of a mold carried on the movable platen; a plurality of plates swingably mounted on the under side of said upper platen and constituting the upper part of the mold; and a mold clamping member for holding the complete mold parts in molding position; said plates and clamping member being tapered so as to wedge the plates onto and around the lower part of the mold; said plates having their inner surfaces machined to provide desired outside appearance of the molded article and rabbeted at the corners of the plates to eliminate fin or flash of the article molded.

Sulphur Molding Composition and Process of Making Same. Carleton Ellis, of Montclair, New Jersey, assignor to Ellis-Foster Company, U. S. P. 1,832,807; Nov. 17, 1931.

The process of making a molding composition which comprises the steps of grinding sulphur with water and bentonite to form a creamy liquid dispersion and incorporating the latter with comminuted wood.

The process of making artificial wood material which comprises incorporating fragments of wood with a water dispersion of sulphur, and hot pressing the resultant material.

The process of making artificial wood material which comprises incorporating fragments of wood with a water dispersion of sulphur, drying, hot pressing, and chilling the resultant material.

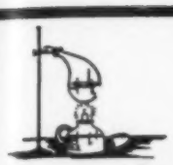
A process which comprises grinding sulphur with water and a dispersion-assisting colloid material of the class including hydrated clay, gum tragacanth, and starch, until a creamy aqueous dispersion is formed, drying such dispersion, mixing the same with a wood filler at any convenient stage, and molding the dried mixture under heat and pressure.

Condensation Product of Carbamides and Aldehydes. Alphonse Gams and Gustave Widmer, of Basel, Switzerland, assignors to the Firm Society of Chemical Industry, Basel, Switzerland. U. S. P. 1, 831,706; Nov. 10, 1931.

A process for the manufacture of solid porous condensation products, substantially free from electrolytes, of carbamides and aldehydes, wherein to a solution of the condensation product from urea and formaldehyde which has been condensed beyond the first stage of condensation there is added an aromatic amine and a quantity of an acidic catalyst sufficient to cause the whole condensation mixture including the solvent present to gelatinize without application of external heat whereupon the solid body thus obtained is allowed to harden, then freed from the catalyst by electroosmosis, and subsequently subjected to pressure.

Editor's Note

Due to lack of space in this issue, the concluding portion of Dr. Aladin's patent review, The Technology of Cellulose Acetate, will appear in an early issue of Plastics.



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And Now, In Closing:

BAKELITE open the new plant at Bound Brook . . . Hercules Powder complete unit at Gillespie, New Jersey, for work on cellulose compounds . . . Bake also had a modernistic and instructive booth at the recent Motor Boat Show . . . Catalin withdraw the Marblette suit . . . and Bernard Pollack, a Catalin Director, heads a company applying for a charter to operate busses in Manhattan! . . . Sparks-Withington Co. (Sparton Radio) enters the electric refrigerator field . . . General Motors may produce a gas refrigerator . . . Radio Corporation holds 67% of RKO stock . . . Lou Sylvester is now with the firm of Charles H. Bower, New York . . . an advertising company, specialists in displays . . . The Auto Show had all sorts of plastics . . . new type, colored, steering wheels, knobs, trim, etc. . . . Ford's new car will use a lot of Lumarith . . . Formica, Beetle and Durand (candy) combine to retail a $5.00 box packing a tray, cocktail glasses and — candy, of course! . . . Dennison's "Fill-Again" tape holder is a neat molding job . . . as is the new combined Hush-a-Phone and clock . . . Woolworth's new cast salt-shapers and cutlery are pretty terrible . . . quality of material way below par . . . Grigsby-Grunow take over Columbia Phonograph in a deal involving upwards of two million . . . Charles W. Curtis, formerly head of Connecticut Telephone, died early in January . . . at the time, he was general manager of Waterbury Clock . . . The Wrigley company order 1,000,000—count 'em—electric clocks from Hammond to be used in dealer tie-up . . . and Chicago Molded get the order . . . Wrigley's death took away a fine man and an intelligent advertiser . . . He once said . . . "Advertising is pretty much like running a furnace; you've got to keep shoveling on coal. Once you stop stoking, the fire goes out."

RADIO FANS ATTENTION!

The subject of plastics will be discussed over WEAF and a National hook-up of affiliated stations on the afternoon of February 23rd. The time will be 2:45, and Dr. H. H. Sheldon, the Speaker, is presented under the auspices of the American Institute, sponsors of the series the "March of Science". Dr. Sheldon has received the nomination for Presidency of the Institute and is Professor of Physics at New York University. He also edits the Science Section of the New York Herald Tribune.

Don't forget—a complete and authoritative review of the field over WEAF at 2:45 P. M., February 23, 1932. Are you listening?

UNDER the sponsorship of Edward Plaut, president of Lehn & Fink, Inc., Professor Edwin R. Seligman of Columbia University conducted a study of price cutting over the last year and a half. His findings were made known the other day: that predatory price cutting that creates cut-throat competition is a menace to retail trade, particularly in depressed times, and of no real benefit in the long run.

This conclusion echoes the sentiments of those who have written us on this subject, and on our December Editorial. Two of those letters are reprinted on the second cover of this issue. As will be seen by reading the following paragraphs, the publication *British Plastics* adopts the same stand. It was printed in their January number.

"Our attention has been drawn to a very out-spoken editorial in our American contemporary, Plastics, who asks, "Isn't it about time to do something?

They state that no branch of their industry is exempt from harmful effects of intentional and malicious price-cutting, especially when the business volume drops to a competitor.

"*Plastics* has vigorously demanded a courageous leader to do a little leading, and to find a penalty for price raiding, and to enforce the penalty indiscriminately. They conclude: "It is time for every man to find the guts to make his business profitable . . . for some one to lead a few sheep in the right direction."

Whilst we can in this country look with pride on many firms who have "the guts to make their business profitable," there are undoubtedly many others who do deliberately obtain business by *no other means* than waiting for a competitor to evolve a new product, and then step in and slaughter the price to his client.

Is it impossible to make these firms realize the vastness of the Plastics Industry and what a wonderful future it has before it?"

MR C. B. HESS of the Genesee Button Corporation, writes, in part: "Your December issue certainly added a great deal of dignity to the profession (?) of plastic molding. A sustained effort of that kind would certainly put us on a par with the chemical and engineering profession, with regard to a trade publication at least".

Thanks, Mr. Hess. We shall do our best to sustain the effort and shoot for that par!